1. Find the derivatives of the following functions. (Do not simplify your answers.)
   a) \( f(x) = (\sec 5x + \tan 4x)^3 \)
   b) \( g(x) = \left[ 4x^2 + x^9(x^4 + 1)^5 \right]^6 \)

2. If \( f(x) = (x + 1)^3 (x - 4)^2 \), find and simplify \( f'(x) \).

3. Find an equation of the tangent line to the graph of \( f(x) = \frac{x - 26}{\sqrt{3}x - 2} \) at \( (2, f(2)) \).

4. Find \( \frac{dy}{dx} \) for the curve \( y^4 + 5xy^2 - 4x^2 = 9y + 3 \cos y \).

5. If \( h(x) = \sin^{-1}(x) \) show how to use the chain rule to find \( h'(x) \), i.e. \( h'(x) = \sin^{-1}(\cos 2x) \).

6. The height (in feet) of a projectile above the ground after \( t \) seconds is given by \( s(t) = -16t^2 + 96t + 640 \). Find the time interval during which its speed is increasing.

7. If \( f(x) = \frac{4x - x^2}{(x^2 + 4)^3} \), find and simplify \( f'(x) \).

8. At 8 AM Pam is 300 mi due west of Sam. If Pam drives due south at the rate of 60 mph and Sam drives due north at the rate of 40 mph, how fast is the distance between them changing at noon?

9. Find \( \lim_{t \to \pi/6} \frac{\sin t - \frac{1}{2}}{t - \pi/6} \). [Hint: Interpret this limit as a derivative.]

10. A conical tank (with vertex down) has a height of 50 ft and a radius of 10 ft. If water is being pumped into the tank at the rate of 36 ft^3/min, find the rate at which the water level is rising when it is 10 ft deep. \( V = \frac{1}{3} \pi r^2 h \) for a right circular cone.

11. Find the slope-intercept for the line which passes through \((0, -24)\) and is tangent to the graph of \( y = 6x^{3/2} \).